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An
Inaugural Essay
on Dentition and Cholera Infantum.
For
the Degree of Doctor of Medicine
in the University of Pennsylvania.

by John A. Urquhart,
of Georgia.

Philadelphia, Feby 3d 1828.

In the following Eſsay I propose to offer some observations on the formation of the teeth, with a few remarks on the influence exercised by the proceſs of dentition, on the animal economy. Though trite, and perhaps already well explained by various writers, the subject may not be considered as ill adapted for an inaugural thesis, inasmuch as, considerable difference of opinion still exists in relation to several important points connected with this subject.

Omitting any preliminary remarks, which might be deemed unneceſsary in this place, I shall proceed at once to state my views of the mode of their development and thus arrive by an analytical method, at my inferences concerning the structure of the teeth.

In the foetus, at about the fourth

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month of gestation, there may be discovered in either jaw, some small cells, seated in a spongy kind of bone denominated alveoli, or alveolar proceſses; these cells are occupied at an earlier period, by an elementary pulp, known as the pulp of the tooth: it is contained in a capsule, which completely invests it, and which also lines the alveolar cavity, by being reflected upwards from the bottom of the socket; it has now the appearance of two sacks, the internal one covering the pulp, and the external answering the place of a periosteum to the interior of the socket; their points of attachment are to the gum above, and to the dental blood-veſsels and nerves below. The pulp, or veſsicle, as it is sometimes termed, furnishes the bony matter of the tooth, by means of transudation from its external surface.

According to Mr Hunter the oſsification

of a tooth, commences on that surface of the pulp next to the gum, by one, or more points, according to the number of projections, or cusps, the future tooth is to have on its grinding surface. In its early stage, the oſseous deposite is soft, and elastic. The pulp is suported by a very delicate membrane, and when fully developed, is found to poſseſs the precise form of the future tooth; it as before stated furnishes the oſseous matter of the tooth by transudation from its external surface; therefore, the first lamina forms the outlines of the tooth, and in proportion as these laminae grow thicker, which is by the gradual acceſsion of new deposites from within outwards, the pulp is in the same proportion compreſsed, and diminished in size, or in the words of Mr Hunter, is converted

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into a fang by its elongation ~~towards~~ towards the bottom of the socket.

The completion of the roots of the teeth is a subsequent proceſs of oſsification; their number is always the same with the number of distinct nerves and bloodveſsels which go to the pulp of the teeth. The roots, in their finished state, are pointed, with a small canal paſsing through them to the bodies of the teeth, in which are lodged the remains of each vesicle, being much smaller at that time, than while in the foetal tooth.

As I have now stated as nearly as I could, all that suggested itself respecting the bony matter of the teeth, together with their mode of developement, and the apparatus by which they are produced, it next becomes eſsential, in order to finish the description of those organs, to give some account of their en

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enamel, or external covering.

This curious substance differs from the other portions of the tooth by its superior hardneſs, aswell as by its want of animal matter, which is poſseſsed by all the true bones of the livingbody.; that it is inorganic, appears to be now generally admitted, from the numerous proofs that have been adduced in favour of that opinion: in the first place, it is never known to be replaced when once removed; it has also a supposed resemblance to the cuticle, the inorganic nature of which no one pretends to deny; but to establish the inorganic nature of the enamel more firmly, it seems sufficient to add that such was the opinion of Mr Hunter, an opinion founded on the result of experiments made for the purpose of ascertaining its truth, and which, made by a man of so high

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I shall have occasion in the next place to advert to the outer one of the two membrans already represented as lining the alveolar cavity, and forming by a reflexion from the bottom of the socket, the internal membrane that invests the pulp. This outside membrane secretes the enamel of the tooth, and deposites it in perpendicular striae, of about half a line in thickness, by which arrangement, together with its extreme hardness, it is enabled to withstand the friction to which the teeth are exposed, without injury.

The crown of the tooth, as far as the neck, is the only part that has a covering of enamel, a circumstance, difficult to account for, since, the membrane which furnishes this substance, goes dou

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down as far as the tooth does.

To account for the fact, that the enamel is not reproduced, is easy, since, it is only nesceſsary to know, that, that portion of the membrane which covered the crown of the tooth, and supplied it with a covering of this substance, is annihilated as soon as the tooth makes its way through the gum.

The teeth, formed upon the membranes just named, are buried beneath the gums On the alveolar surface of each infant jaw, at birth, small cells are discernible, in which, the rudiments of all the teeth, both deciduous and permanent, are ready formed; at an earlier period, a longitudinal groove exists, in place of them, in which, these cells are afterwards formed by the deposition of bony matter in transverse ridges, dividing

it at first into superficial depreſsions, which appear to be influenced in their size, by the growth of the teeth. The roots of the deciduous teeth, at the period of birth, are not completed, but, are somewhat elongated towards the bottom of the sockets or alveoli.

At about the expiration of six months after birth, the tooth is more fully develloped, and begins, by a certain proceſs, to make its way through the gum; the roots in elongating themselves, cause the body of the tooth to rise and preſs on the portion of the gum and membranes immediately above; in this manner, the absorbents are excited to remove the parts just mentioned, and the entire expulsion of the body of the tooth is effected without further interruption.

The teeth which are first cut, are the two lower middle incisors; their appearance through the gum is announced, at first, by pain and

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tumefaction in the part, succeeded by their eruption, which takes place between the fourth and eighth month after birth. The next which are cut, are the upper incisors, and the two lower, on the side of those already cut. The first Molar, on each side, are next in succeſsion, and are followed by the cuspidati or canine teeth; and, at the end of the second year, the last Molar appears, which completes what is termed the first dentition; this furnishes the child with eight incisor, four canine, and eight molar, making in all, twenty teeth which is its complement.

The shedding of the deciduous theeth, commences about the sixth or seventh year, though in a way evidently not well understood, as appears from the diversity of opinion which exists as to the nature of the proceſs; some supposing it to depend on preſsure exerted by the permanent teeth on the roots of the deciduous ones, and in that way causing the absorption of their fangs; while others

contend that it is not produced by mechanical preſsure, but that it is a particular proceſs in the animal economy.

The deciduous teeth become looſe, as already stated, and are succeeded by the permanent; the order of their shedding is as follows. The incisors loosen about the sixth or seventh year, and are succeeded by the permanent cutting teeth; the first infant molaris, loosens from the seventh, to the ninth year; the cuspidatus gives way about the tenth year, and the second molar follows in the twelfth, or a little later.

The permanent incisors are formed, as to their bodies, at the period of birth, as is also the permanent grinder, on each side.

I have already noticed, in a cursory manner, the proceſs by which the eruption of the teeth is effected, and in attempting to describe it more fully, I fear I should do little more than repeat what I have already said;

I will, therefore, dismiſs that part of my subject, and proceed to the consideration of the influence exercised on the animal oeconomy, by the proceſs of dentition.

The physiological proceſs of dentition is an important act, as it very frequently gives rise to a variety of pathological affections, some of which exert so fatal a sway among us, as to give it a character of great importance, thereby demanding much interest in the investigation of its history. Dentition is objected to by many, as a cause of the various diseases that are imputed to it by others of equal weight and respectability. That it should excite disease, is to me a matter of no surprise, since the whole tooth is invested with a delicate, and sensible tiſsue, which, as soon as the tooth acquires an increase of size is rendered so tense, that pain and inflamation ensue, which is extended to the contiguous parts. That it should stop there, when exceſsive

would indeed be a matter of some astonishment; for, it has been satisfactorily demonstrated, that, irritation arising from a merely local disorder, may, through the brain and nervous system, produce very great derangements of the digestive, or other organs. I infer, that, in infants, the process of dentition is often the source of very considerable irritation, which, seated in the gums and jaws, readily radiates as above said, to the digestive organs, producing fever, imperfect digestion, and Cholera —; on the last of which, I will now offer a few remarks.

Cholera Infantum mostly seizes children between their fifth, and twentieth month; they are also more liable to the disease during summer than at any other season of the year, and in cities, or other crowded situations, more than in the country, though it is by no means confined exclusively to

One of the most fruitful sources of

any particular season or situation.

The proceſs of dentition is known to occur at all seasons, and to be attended with more or fewer of the symptoms which characterize the complaint under consideration; and many are led to object to it as a cause of this disease, from its comparative rarity in the country, and in cities during *winter*.

The belief, however, that dentition is *the most fruitful source of Cholera*, seems to be established from the fact, of children being more rarely afflicted with it after that period is paſsed, and also from the circumstance, that teething is going on in vastly the greater number of cases where it proves fatal.

After the disease is fairly established, the function of the liver is found in almost every case to present certain morbid phenomena, the most common of which is

diminished secretion, owing probably to congestion of that viscus, this is accounted for by a general pathological principle, which is, that, increased excitement cannot be long continued in the human body, without destroying the equilibrium of the circulation, which is absolutely neceſsary to the healthy condition of the human frame.

The liver in a young child, from its disproportion, in point of size, to, the other viscera, and the sluggish action of its veſsels, seems to be rendered more susceptible of morbid derangements, and particularly those of a congestive nature, than in an adult.

These determinations to the different viscera produce a disordered state of the general capillary circulation, which induces at once, derangement of the important function of perspiration; the skin becomes dry and husky, and no longer executes with regularity the off

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the offices aſsigned to it; the consequence is an increased secretion of fluids in the intestinal canal, which becomes disordered from the vicious nature of those matters.

In Cholera Infantum, free discharges of bilious matter, either by vomiting or stool, are of rare occurrence; hence, the inference, that, too great a determination of blood to the portal system has taken place, which disqualifies the liver for the performance of its healthy functions.

The brain, in congestive apoplexy, where the intellectual functions are much interrupted or entirely suspended, may be cited as analagous in its nature to this state of the liver. The lungs, in Pneumonia Notha, bear very much the same character as in this case there are effusions into the lungs which prevent a decarbonization of the blood.

Cholera is perhaps a term the least expreſsive of the facts that occur in this disease

that could be chosen, as there is a remarkable absence of bilious matters in the vomiting, or purging, which forms perhaps the most prominent feature in its character.

That there are sometimes discharges of bilious matter is not to be doubted, and, particulary, in those cases which do not terminate fatally in a very short time; if the stools are not decidedly bilious, spots of a greenish appearance, may be discovered on a muco-serous base, denoting a very diminutive biliary secretion. But, in a majority of cases, particularly, acute ones, there is an entire want of bilious matter. An attempt to prove that there is a disorder of this kind in the secretory function of the liver, I conceive entirely unneceſsary, as the fact appears to be admitted by every one.

An offensive odour, resembling that of fluid animal matter undergoing putrefaction form

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fermantation, is a <u>mark</u> of this disease, and which is always removed when a flow of bile takes place; were arguments at this time nesceſsary to establish the above position, (a diminished biliary secretion) I would offer this, as one almost sufficient in itself to remove every doubt.

If I regard Cholera then, as a gastric irritation, connected with congestive disease of the liver, occasioning diminished secretion of bile; frequent vomiting; large and peculiarly offensive stools; great emaciation, paleneſs languor, and tendency to fainting, and sinking, I shall, perhaps have sufficiently laid down my views of its early pathology.

In the progreſs of the disease, the pathological state of the patient is frequently altered, as is exemplified in many of those cases which occur about June, or July, where the patients lingers until the frosts of october or November, before they begin to recover; and not a few becom

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become victims of the chronic forms; and they perish at all periods, from three or four days, to as many months.

Under this protracted form, it is evident that the mucous membrane of the bowels will suffer more or leſs; there will also be derangement of the portal circulation; the lacteal and lymphatic absorbents of the whole abdominal cavity, will experience much derangement as to their functions: the body, will, therefore, be imperfectly nourished, and a state of cachexy or marasmus will be the result.

Dysenteric symptoms are not uncommon as is affirmed by writers on this disease, and it appears particularly when connected with it, that there is an ulcerous condition of the colon and rectum.

I shall now proceed to state, in a few words, the treatment to be pursued.

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This part of my Eſsay must be nesceſsarily imperfect, as I have occupied much of the preceding portion in anatomical details, and have, therefore, but little room to devote to the therapeutical division of this subject, as laid down by the books.

The indications of cure, are, in the first place to be carefully ascertained. In the early stage, where the disease is slight, the stomach and bowels being but little affected, the indication will be to remove the prime source of irritation in the gums by lancing them freely; the other causes may be removed by completely evacuating the alimentary canal of its irritating contents, and thus, by removing the causes of irritation, an opportunity is afforded the liver either to unload itself by reestablishing its lost powers of secretion, or a more healthy portal circulation, for it is not likely, that,

the other veſsels of the abdomen than these immediately concerned in the portal circulation, can be unaffected by the operation of gentle evacuants.

Lancing the gums, and gentle evacuants, as Castor oil, Oleaginous mixture, Spiced Rhubarb, Rhubarb and Magnesia, Calomel, in small doses, either combined with Rhubarb, or followed by oil, are, perhaps, the best evacuants. Neutral salts, and hydragogue medicines, are considered as hurtful, by irritating the bowels in such a way as to keep up too copious a secretion from them. Injections of flax-seed tea, mucilage of slippery Elm, Starch, Arrow Root &c. &c. are of much value, as they leſsen very much, the irritation, and at the same time keep the bowels soluble.

In cases of a severer nature, where the vomiting is obstinate, much may be expected from mustard, or blistering plasters, applied to the epigastrium, also, spiced plasters,

hot brandy and laudanum, and other similar applications, are of great importance.

Small doses of calomel, as the fourth, the sixth, or the eighth of a grain, combined with a little gum arabic, may be given every hour; and to allay the irritability of the stomach, which is of much importance, Lime water and Milk, or Soda water, may be given.

I should have mentioned that an injection of laudanum and starch, would have a more, desided effect in allaying that condition of the stomach just mentioned, than almost any other remedy. The diet of the Child, if a nursling, should consist of its mothers milk in prefference to any thing else.

The methods of combating a severe attack, have now been laid down. The after treatment consists in attention to

the clothing and diet of the patient, and the use of some mild tonic, as the Extract of Gentian, or Sulp. of Quinine in syrup.

Country air is of the greatest importance; and when practicable, the patient should not be denied the surest, and in some cases, the almost only resource for recovery; when this cannot be obtained, as a substitute, exercise in a carriage in fine weather; or sailing may be had recourse to; something of the kind is considered of vital importance for the restoration of health and strength.

I shall here close my account of Cholera, because, when the disease becomes chronic, it partakes more of the nature of Marasmus, for an account of which, I refer to the excellent work of Dr. Ayre.

Hoping that the want of any considerable personal experience, may serve as my excuse for the absence of minute details; and

the omission of probably some important indications as to the character or treatment of the disease, I beg leave to offer the above sketch, rude and imperfect as it may be, to the consideration of my respected teachers.

J. A. Urquhart